INCH-POUND

MIL-I-46058C
AMENDMENT 7
14 September 1993
SUPERSEDING
AMENDMENT 6
8 November 1982

MILITARY SPECIFICATION

INSULATING COMPOUND, ELECTRICAL
(FOR COATING PRINTED CIRCUIT ASSEMBLIES)

This amendment forms a part of MIL-I-46058C, dated 7 July 1972, and is approved for use by all Departments and Agencies of the Department of Defense.

PAGE 1

1.2: After Polyurethane resin, add "(formerly type PUR)".

* 2.1: Delete "QQ-S-571 - Solder, Tin Alloy, Tin-Lead Alloy, and Lead Alloy." and substitute "QQ-S-571 - Solder, Electronic (96 to 485°C)."

* 2.1: Delete "PPP-C-300 - Chemical, Liquid, Packaging and Packing of." and substitute "PPP-C-2020 - Chemicals, Liquid, Dry and Paste: Packaging of."

* 2.1: Delete "PPP-D-729 - Drum, Metal, 55-Gallon (for Shipment of Noncorrosive Material)." and substitute "PPP-D-729 - Drums, Shipping and Storage, Steel, 55-Gallon (208 Liters)."

* 2.1: Delete "PPP-P-704 - Pail, Shipping, Steel (1 through 12 Gallon)." and substitute "PPP-P-704 - Pail, Metal: (Shipping, Steel, 1 through 12 Gallon)."

* 2.1: Delete "MIL-P-13949 - Plastic Sheet, Laminated, Metal-Clad (for Printed Wiring)." and substitute "MIL-S-13949/4 - Sheet, Printed Wiring Board, Laminated, Base Material GF (Woven E-Glass Reinforcement, Majority Difunctional Epoxy Resin, Flame Resistant, Metal-Clad or Unclad)."

* 2.1: Delete "MIL-C-45662" and substitute "MIL-STD-45662"

* 2.1: Delete "MIL-C-81302 - Cleaning Compound, Solvent, Trichlorotrifluoroethane."

Footnote 1/, delete and substitute:

"1/ This type coating is controlled by a proprietary process. Patents and expiration dates are as follows:

U.S. 3,221,068 - 30 November 1982
U.S. 3342,754 - 19 September 1984
U.S. 3288,728 - 29 November 1983
U.S. 3472,795 - 14 October 1986

The Government does not have a royalty free license."

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* 2.1: Delete "FED-STD-406 - Plastics, Methods of testing."

* 2.2: Delete "D 150 - Methods of Test for AC Capacitance, Dielectric Constant and Loss Characteristics of Electrical Insulating Materials." and substitute "D150 - Standard Test Method for A-C Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulating Materials."

* 2.2: Delete "G 21 - Recommended Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi." and substitute "G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi."

* 2.2: Add the following new ASTM documents:

"D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position."

"D1005 - Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers."

3.2, line 3: After fluorescent, add "except types SR and XY".

3.3, line 4: Delete "(see 6.1.6)" and substitute "(see 6.1.7)."

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3.5, delete and substitute:

"3.5 Appearance. When coating materials are tested as specified in 4.8.2, the coating shall be smooth, homogeneous, transparent, unpigmented with no dye added. A colorless additive to impart fluorescence is allowed (see 3.2). The coating shall be free from bubbles, pinholes, whitish spots, blistering, wrinkling, cracking, and peeling. The coating shall not mask or obliterate the identification markings and color codes on electronic components. The coating shall not discolor the printed conductors and base materials greater than the discoloration caused by conditioning when uncoated. The coating shall not corrode any metals being coated."

3.6, line 3: Delete "0.0006 ±0.0001 inch" and substitute "within the range of .0005 to .0020 inch)".

* 3.11, second sentence, delete and substitute:

"The minimum Q value for uncoated type GF base materials (MIL-S-13949/4) at frequencies of 1 and 50 megahertz (MHz) shall be 50 and 70, respectively (see 6.1.8)."

3.11, Table, Conditioning column, Before and after coating: Delete the following values in last line "100 MHz, 9, 14, 12, 10 ,11".

3.11, Table, Conditioning column, Before and after immersion: Delete the following values in last line "100 MHz, 7, 20, 16, 10, 7".

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3.15, delete and substitute:

"3.15 Thermal-humidity aging. When tested as specified in 4.8.12, the coating materials shall meet the following requirements:

"3.15.1 Hydrolytic stability. There shall be no evidence of reversion as indicated by softening, chalking, blistering, cracking, tackiness, loss of adhesion, or liquefaction.

* "3.15.2 Discoloration. The examination shall determine legibility and distinguishability of identification markings and color codes used to identify parts."

* 4.1.1: Delete "MIL-C-45662" and substitute "MIL-STD-45662".

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TABLE I, Group VI: Delete "Hydrolytic stability" and substitute "Thermal-humidity aging".

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* 4.6.1.3.1, first sentence, delete and substitute: "One container of each ingredient necessary to form the compound shall be selected from one production lot every 12 months."

4.6.1.3.2, delete and substitute:

"4.6.1.3.2 Failures. If one or more samples specimens fail to pass group B inspection, the lot shall be considered to have failed."

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TABLE IV: Delete "Hydrolytic stability" and substitute "Thermal-humidity aging".

TABLE IV, Fungus resistance: Delete "3.16" and "4.8.13" and substitute "3.7" and "4.8.4", respectively.

* 4.6.3: Delete "PPP-C-300" and substitute "PPP-C-2020"

* 4.7.1.1, line 2: Delete "(FLGFN062C2 OB1A) in accordance with MIL-P-13949." and substitute "in accordance with MIL-S-13949/4."

4.7.1.1, line 3: Delete "hydrolytic stability" and substitute "thermal-humidity aging".

* 4.7.1.1(a), line 2: Delete "and MIL-P-13949".

* 4.7.1.1(a)(1): Delete "trichloroethylene" and substitute "a suitable solvent normally used to clean contaminants from printed wiring and terminal-board assemblies".

4.7.1.1(a)(5): Delete "of" and substitute "or".

4.7.1.1(b), last sentence, delete and substitute: "For the thermal-humidity aging test only, one resistor in accordance with MIL-R-39008/4 and one resistor in accordance with MIL-R-55182/7 shall be soldered to each of the test panels. (Color code selected shall be indicated in the test report.)"

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FIGURE 1: Insert "1.5 ±.06" dimension for overall width and add "±.06" tolerance to 3 inch-length of test pattern.

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* 4.7.1.1(c), delete and substitute:

"(c) Once soldered, the test panels shall be cleaned of all traces of rosin flux and other contaminants by scrubbing in suitable solvents normally used to clean contaminants from printed wiring and terminal-board assemblies."

* 4.7.1.1(c)(1), (2), and (3): Delete in their entirety.

* 4.7.1.2, line 2: Delete "(FLGFN062C2/OB1A) in accordance with MIL-P-13949" and substitute "in accordance with MIL-S-13949/4".

* 4.7.1.2(a), line 2: Delete "in accordance with MIL-P-13949".

4.8, title: Delete "examinations and tests" and substitute "examination and test".

4.8.2, second line: After illumination, add "except types SR and XY, which shall be examined under normal light."

* 4.8.3, second sentence: Delete "method 6183 of FED-STD-141" and substitute "ASTM D1005". Line 4: Delete "optically" and substitute "using any micrometer or instrument accurate to .0001 inch or by an optical interference method".

4.8.8, delete and substitute:

"4.8.8 Q (resonance) (see 3.11). Measurements made to determine percentage change in Q shall be performed on an instrument capable of producing repeatable readings. In case of dispute regarding the values of change, a bridge having an accuracy of ±1 percent shall be used as referee. The Q of the test panels shall be measured at 1 and 50 MHz before coating and the values averaged. The coating material shall then be applied to the test panels as specified in 4.7.1.1. The Q of the coated test panels shall be measured and the values averaged at 1 and 50 MHz and again after immersion in distilled water for a period of 24 +2, -0 hours at a temperature of 23°C ±2°C. All tests shall be completed within a period of 5 hours after removing the specimens specified in 4.4."

4.8.8(b), line 2: Delete "what" and substitute "that".

4.8.9(a): Delete "(C-2 for type SR only)".

4.8.10: After first sentence, add "Polarizing voltage of 100 volts, dc, shall be applied during test."

4.8.12, delete and substitute:

"4.8.12 Thermal-humidity aging (see 3.15). One panel shall be maintained as a control at 25°C and 50 percent relative humidity. Three panels shall be subjected to 120 days at 85°C ±1°C and 95 ±4 percent relative humidity, and examined as follows (using normal or corrected 20/20 vision):

(a) After 28, 56, and 84 days of exposure, the panels shall be returned to 25°C and 50 percent relative humidity and held for 2 hours. The panels shall be examined following each exposure and then returned to the chamber for continuation of conditioning.

(b) After the 120-day aging period, the panels shall be returned to 25°C and 50 percent relative humidity and held 7 days. The panels shall be examined and compared with the control panel. The panels shall also be tested for tackiness in accordance with method 4061 (dry-through for varnish, lacquers and enamels) of FED-STD-141."

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* 4.8.13, line 2: Delete "method 2021 of FED-STD-141" and substitute "ASTM D635".

* 4.8.13: End of paragraph, add "If the specimen does not ignite on two attempts, it is judged as nonburning by this test. The sample shall be judged as nonburning by this test when all specimens do not burn. If a specimen does not burn to the 4-inch mark after the first or second ignition, it is judged as self-extinguishing by this test. The sample shall be judged as self-extinguishing by this test if more than two of the test specimens tested are found to be self-extinguishing with the rest nonburning."

* 5.1, line 1: Delete "PPP-C-300" and substitute "PPP-C-2020".

6.1.3, line 1: Following dielectric, add "strength".

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* 6.1.7, second sentence, delete and substitute:

"Coating covered by this specification are not suitable for use on boards fabricated from types GP, GR, GT, GX, or GY (polytetrafluoroethylene resin) laminates in accordance with MIL-S-13949."

6.1.8, first sentence, delete and substitute:

"The typical Q for uncoated type GF laminated at frequencies of 1 and 50 megahertz (MHz) are 60 and 80, respectively."

6.4, line 3: Delete "type" and substitute "by".

6.4, last sentence, delete and substitute the following:

"Buffer material is not required when conformal coating types SR, XY, UR, and AR are used. Buffer material should be required for type ER, unless thermal shock test data in accordance with MIL-STD-202, method 107, test condition B-2 is furnished to substantiate that there is no stress cracking of the component or other adverse effects between the conformal coating and the parts and other materials used in printed-wiring assembly."

Concluding material: Delete and substitute as printed in this amendment.

The margins of this amendment are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous amendment were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous amendment.

CONCLUDING MATERIAL

Custodians:
Army - ER
Navy - EC
Air Force - 85

Review activities:
Army - AR, MI
Navy - AS
Air Force - 99
DLA - ES
NS

User activities:
Army - AV
Navy - MC, OS, SH

Preparing activity:
Army - ER

Agent:
DLA - ES

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